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The search for eV sterile neutrinos with the STEREO experiment

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In the last decade, two unsolved anomalies have appeared from the study of reactor neutrinos: one related to the neutrino spectral shape, and another to the absolute neutrino flux. The second one, known as the Reactor Antineutrino Anomaly, presents a deficit in the observed flux compared to the expected one that could point to the existence of a light sterile neutrino in the eV range participating in the oscillation phenomena.

The STEREO experiment is a short baseline reactor antineutrino experiment trying to test the existence of those sterile neutrinos. This experiment, taking data since the end of 2016, measures the antineutrino energy spectrum from the compact core of the research reactor of the Institut Laue-Langevin (Grenoble, France) operated with highly enriched U-235 fuel. Covering baselines between 9 and 11m with a segmented neutrino target, STEREO can study the rate of neutrino interactions and compare it among cells to test oscillation hypotheses at different distances from the source. STEREO can also measure the absolute neutrino flux and spectral shape emitted from a pure U-235 core.

Neutrino data from 179 (235) days of reactor turned on (off) have been analyzed, showing compatibility with the null oscillation hypothesis and rejecting the best fit point of the Reactor Antineutrino Anomaly at 99.8% C.L. In this talk, these results together with the latest improvements in the description of the detector models and the background treatment are reported, providing a crucial input in the search for sterile neutrinos.

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